

Minor Planet 1566 Icarus - Asteroid or Comet? D.K. Yeomans

Of the dozen well-observed, near-Earth asteroids that are suspects for inactive comets, only 1862 Apollo and 1566 Icarus show any indication that their orbital motions are affected by nongravitational perturbations -- effects that are normally associated only with active comets. By employing a cometary nongravitational force model, based upon the outgassing of a water ice nucleus, the orbital fits to the optical and radar astrometric data are improved for both Apollo and Icarus. A reliable value for the magnitude of these nongravitational effects can be determined for Icarus, but not Apollo. Because Icarus is less than a kilometer in extent, the small amount of outgassing required to explain its anomalous orbital behavior would probably not be sufficient to create an easily visible coma. While these results do not prove that 1566 Icarus is an active comet masquerading as an asteroid, this object certainly deserves future scrutiny to determine its true identity.

A near-Earth asteroid showing cometary activity must represent only the tip of a much larger cometary iceberg. For such an object whose aphelion is well inside Jupiter's orbit, the time scale for losing its volatiles is much shorter than the time scale for evolving out of the inner solar system. Thus for each active member of the near-Earth asteroid population, there must be many more that are temporarily or permanently inactive.